2827

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Docket No.: P/62991

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#7/A Amdt Ltr to Draftsman DS J. Manella 7/31/02

In re: Application of	:	Klaus JUNGER, et al.	
Serial No.	:	09/928,240	Group Art Unit: 2827
Filed	:	August 10, 2001	Examiner: J. C. Norris
For	:	METHOD FOR DISPENSING ADHESIVE ON A CIRCUIT BOARD CARRIER MEMBER AND CIRCUIT-BOARD PROVIDED THEREBY	

New York, New York
July 10, 2002

AMENDMENT &
INFORMATION DISCLOSURE STATEMENT

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

In response to the Official Action dated April 10, 2002, please amend this patent application as follows:

IN THE CLAIMS:

Please cancel claims 1-12, without prejudice.

Please add new claims 13-41 as set forth on the enclosed pages.

REMARKS

Enclosed, for the Examiner's approval, is a copy of Figs. 1-4b marked with the legend "*Prior Art*".

Also enclosed is Form PTO-1449 listing the references cited in a European Search Report in respect of the corresponding European applications. A copy of each listed reference and the Rule 17(p) fee of $180.00 are enclosed. Consideration and entry of these references are respectfully requested.

The present invention concerns a dispensing method and circuit arrangement comprising a number of electrical components (11, 12), e.g., substrates such as MMICs, that are secured to a carrier (15) by means of an electrically conductive adhesive (13, 14). Typically, the carrier constitutes an electrical ground plane and the adhesive provides both mechanical fixing and electrical continuity between a ground plane of the components and the carrier. Electrical interconnection between the components is achieved by wire-bonds (20) that are secured to pads (18, 19) on an upper surface of the component, i.e., distal to the carrier. For microwave applications, it is desirable to keep the wire-bonds as short as possible and preferably the same length, thereby resulting in the interconnections being made between edges of adjacent components.

In such a circuit arrangement, a problem can arise if the electrically conductive adhesive used to bond the components to the carrier finds its way into the gap between the adjacent components in the vicinity of the wire-bond junction or interconnection (page 2, lines 3-7). Since the adhesive is electrically conducting, it increases the parasitic capacitance associated with the interconnection with a consequent deleterious effect on the circuit performance. The present invention seeks to solve this problem.

The inventors have appreciated that the known method of dispensing adhesive in the form of certain patterns can give rise to an accumulation of adhesive in localized areas; these being most likely to occur at the starting area, or ending area, or turning area of the dispensed adhesive defining the pattern. The present invention solves this problem by dispensing the adhesive such as to ensure that there are no such accumulations occurring within the footprints of the components in the area of any wire-bonds. The replacement set of claims 13-41 more clearly defines the scope of the invention to obviate the indefiniteness rejection and to distinguish the invention over the known art.

Claims 1-2, 6-9 and 11-12 were rejected under U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,019,944 to Ishii, et al. Ishii, et al. concerns the mounting of integrated circuits (5-7) onto a printed circuit board (substrate 1 and pattern of conductors 2). The circuits are *mechanically* secured to the circuit board by an adhesive film or layer 4 covering the entire surface of the printed circuit board. Electrical connection between the circuits and a corresponding conductor (2) is achieved by metal nodules (3) which are deposited on the conductor and which project through the adhesive layer when the circuit is

mounted under pressure to the circuit board. In contrast to the present invention as defined in the replacement set of claims, Ishii, et al. neither discloses nor teaches:

- use of an electrically conductive adhesive (inherently the adhesive layer 4 of Ishii has to be insulating; otherwise, the entire circuit will be shorted out by the adhesive layer);
- dispensing adhesive in a pattern (there is no pattern of adhesive as such since the entire surface of the circuit board is coated);
- electrically interconnecting circuit components by means of an overhead electrical conductor at a junction; and
- dispensing the adhesive such as to ensure that the starting and ending areas, at which greater quantities of the adhesive are accumulated, are located away from the junction at which the overhead conductor spans the gap between the components, and further that the pattern has a lesser quantity of the adhesive at the junction to resist the flow of the adhesive into the gap at the junction after placement of the components on the adhesive.

Accordingly, it is submitted that the present invention is both novel and involves an inventive step in view of Ishii, et al.

The indicated allowability of claims 3-5 and 10 is gratefully acknowledged, and their subject matter has been incorporated into the replacement claims.

The excess claims fee of $162.00 for nine (9) extra total claims is enclosed.

Wherefore, a favorable action is earnestly solicited.

Respectfully submitted,

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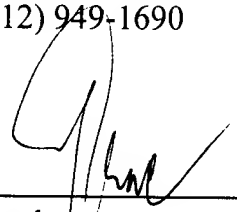

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NEW CLAIMS

13. A method of dispensing an electrically conductive adhesive on, and in electrical continuity with, a carrier to resist a flow of the adhesive into a gap bounded by adjacent components placed at respective footprints onto, and secured by the adhesive on, the carrier, the components carrying electrical signals and being interconnected by an overhead electrical conductor spanning the gap at a junction, the method comprising the steps of:

a) starting the dispensing of the adhesive at a starting area on the carrier prior to placement of the components,

b) continuing the dispensing of the adhesive in a pattern on the carrier prior to interrupting the dispensing of the adhesive at an ending area, the pattern having a lesser quantity of the adhesive at the junction as compared to a greater quantity of the adhesive at each of the starting and ending areas to resist the flow of the adhesive into the gap at the junction after placement of the components, and

c) locating the starting and ending areas away from the junction.

14. The method of claim 13, wherein at least one of the starting and ending areas is outside the footprints and the gap.

15. The method of claim 13, wherein the starting and ending areas are located at opposite ends of a line of which the pattern is comprised.

16. The method of claim 13, wherein the starting step is performed a plurality of times to form a plurality of starting areas, wherein the interrupting step is performed a plurality of times to form a plurality of ending areas, and wherein the pattern is comprised of a plurality of lines each having one of the starting areas and one of the ending areas at opposite ends of a respective line.

17. The method of claim 16, wherein the lines are formed in mutual parallelism.

cont'd A1

18. The method of claim 16, wherein the lines are linear.

19. The method of claim 13, wherein the dispensing of said lesser quantity of the adhesive at the junction is performed by dispensing an adhesive line of uniform height above the carrier.

20. The method of claim 13, wherein the dispensing of said lesser quantity of the adhesive at the junction is performed by dispensing an adhesive line of uniform width transverse to the adhesive line.

21. The method of claim 16, wherein all of the starting and ending areas are located outside the footprints and the gap.

22. The method of claim 13, wherein the dispensing of said lesser quantity of the adhesive is continuously performed across the junction.

23. The method of claim 22, wherein the dispensing of said lesser quantity of the adhesive is applied in a direction transverse to the electrical conductor across the junction.

24. The method of claim 23, wherein said direction remains constant.

25. A circuit arrangement, comprising:

a) a carrier;

b) an electrically conductive adhesive on, and in electrical continuity with, the carrier;

Contd A1

c) a plurality of adjacent components carrying electrical signals and bounding a gap and placed at respective footprints onto, and secured by the adhesive on, the carrier;

d) an overhead electrical connector interconnecting the components and spanning the gap at a junction; and

e) the adhesive being applied in a pattern beginning at a starting area and interrupted at an ending area, the pattern having a lesser quantity of the adhesive at each of the starting and ending areas to resist a flow of the adhesive into the gap at the junction after placement of the components, the starting and ending areas being located away from the junction.

26. The arrangement of claim 25, wherein at least one of the starting and ending areas is outside the footprints and the gap.

27. The arrangement of claim 25, wherein the starting and ending areas are located at opposite ends of a line of which the pattern is comprised.

28. The arrangement of claim 25, wherein the pattern has a plurality of starting areas, a plurality of ending areas, and a plurality of lines each having one of the starting areas and one of the ending areas at opposite ends of a respective line.

29. The arrangement of claim 28, wherein the lines are linear and in mutual parallelism.

Cont'd #1

30. The arrangement of claim 28, wherein all of the starting and ending areas are located outside the footprints and the gap.

31. The arrangement of claim 25, wherein the pattern includes an adhesive line of uniform height and width extending in a direction across the junction.

32. The arrangement of claim 31, wherein the direction of the adhesive line is constant and transverse to the conductor.

33. A method of dispensing an electrically conductive adhesive on a circuit-board carrier member for securing thereto, and providing electrical continuity thereto, of a first electrical component and a second electrical component, the electrical components being secured in an adjacent spaced relationship to the carrier member, the electrical components being electrically interconnected in an area of adjacency by means of at least one electrical conductor connected to an upper surface of each electrical component that is distal to the carrier member, the method comprising the steps of: dispensing the electrically conductive

adhesive onto the carrier member in a predefined pattern beginning at a starting point and ending at an end point, and ensuring that there are no starting and end points in the predefined pattern within an anticipated footprint of the electrical components in the vicinity in which the electrical components are to be interconnected to thereby ensure that no adhesive enters a space between the electrical components when the electrical components are mounted to the carrier member.

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34. The method as claimed in claim 33, and comprising dispensing the electrically conductive adhesive continuously in the anticipated footprint of the electrical components in the vicinity in which the electrical components are to be interconnected.

35. The method as claimed in claim 33, and comprising dispensing the electrically conductive adhesive to form the predefined pattern of a plurality of lines.

36. The method as claimed in claim 35, and comprising dispensing the electrically conductive adhesive to form the predefined pattern of a plurality of substantially parallel lines.

37. The method as claimed in claim 35, and comprising dispensing the electrically conductive adhesive in the form of a plurality of substantially straight lines.

38. The method as claimed in claim 35, and comprising dispensing the electrically conductive adhesive in the form of a plurality of lines of substantially constant width in a plane parallel to a major face of the carrier member over a portion of the lines which lie within the footprint.

39. The method as claimed in claim 35, and comprising dispensing the electrically conductive adhesive in the form of a plurality of lines of substantially constant height above the carrier member over a portion of the lines which lie within the footprint.

40. The method as claimed in claim 33, and comprising dispensing the electrically conductive adhesive onto the carrier member in the predefined pattern while ensuring that all starting and end points in the predefined pattern lie outside the footprint of the electrical components and are remote from the vicinity in which the electrical components are to be interconnected.

41. The method as claimed in claim 33, and comprising dispensing the electrically conductive adhesive in lines that run in a direction which is substantially transverse to the direction of the at least one electrical conductor interconnecting the electrical components.